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CUSTOMER NO.: 24498
Serial No.: 10/561,361
Non-final Office Action Dated: September 7, 2007
Final Office Action Dated: June 10, 2009

PATENT
PU030180 (156-762)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants: Jill MacDonald Boyce

Examiner: Jessica M. Roberts

Serial No: 10/561,361

Group Art Unit: 2621

Filed: December 19, 2005

Docket: PU030180 (156-762)

For: MULTIPASS VIDEO RATE CONTROL TO MATCH SLIDING WINDOW CHANNEL CONSTRAINTS

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Applicants appeal the status of Claims 1 and 3-22 as presented in response to the non-final Office Action dated September 7, 2007 and rejected in the final Office Action dated June 10, 2009, pursuant to the Notice of Appeal filed on October 22, 2009 and submit this appeal brief.

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PATENT
PU030180 (156-762)

1. Real Party in Interest

The real party in interest is THOMSON LICENSING S.A., the assignee of the entire right title and interest in and to the subject application by virtue of an assignment recorded with the Patent Office on **[TBD]** at reel/frame **[TBD]**.

2. Related Appeals and Interferences

None

3. Status of Claims

Claims 1 and 3-22 are pending. Claims 1 and 3-22 stand rejected and are under appeal. Claim 2 has been cancelled without prejudice.

A copy of Claims 1 and 3-25 is presented in Section 8 below.

4. Status of Amendments

An Amendment under 37 CFR §1.111, filed with the PTO on December 26, 2007 in response to a non-final Office Action dated September 7, 2007, was not entered. An Amendment under 37 CFR §1.111, filed with the PTO on July 21, 2008 in response to a Notice of Non-Compliant Amendment dated May 8, 2008 and the non-final Office Action dated September 7, 2007, was entered. No responses/amendments were filed subsequent to the above Amendment filed on July 21, 2008. A final Office Action dated June 10, 2009, to which this appeal brief is directed, is currently pending.

5. **Summary of Claimed Subject Matter**

Independent Claim 1 is directed to "[a]n encoder for encoding a sequence of pictures as a plurality of block transform coefficients to meet network traffic model restrictions, the encoder comprising an iterative loop for selecting one of a plurality of quantization parameter values for each picture" (Claim 1, preamble).

"[P]re-encoding means for pre-encoding the sequence of pictures for each of a plurality of quantization parameter values" is described, e.g., at: pg. 9, lines 5-11; pg. 7, lines 9-11; and pg. 2, lines 7-8. Moreover, the subject matter of this element involves, e.g.: blocks 214, 216, 218 and 220 of FIG. 1.

"[S]electing means for selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window" is described, e.g., at: pg. 9, lines 11-16; pg. 7, lines 11-14; and pg. 2, lines 9-10. Moreover, the subject matter of this element involves, e.g.: blocks 222, 224 and 226 of FIG. 1.

"[E]ncoding means for encoding each picture of the sequence using the quantization parameter value selected for that picture" is described, e.g., at: pg. 9, lines 16-22; pg. 7, lines 14-15; and pg. 2, lines 10-11. Moreover, the subject matter of this element involves, e.g.: block 228 of FIG. 1.

Independent Claim 13 is directed to "[a] computer program product comprising a computer useable medium having computer readable program code embodied thereon for use in a video encoder" (Claim 13, preamble).

"[P]rogram code for pre-encoding the sequence of pictures for each of a plurality of quantization parameter values" is described, e.g., at: pg. 9, lines 5-11; pg. 7, lines 9-11; and pg. 2, lines 7-8. Moreover, the subject matter of this element involves, e.g.: blocks 214, 216, 218 and 220 of FIG. 1.

"[P]rogram code for selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in the sliding time window" is described, e.g., at: pg. 9, lines 11-16; pg. 7, lines 11-14; and pg. 2, lines 9-10. Moreover, the subject matter of this element involves, e.g.: blocks 222, 224 and 226 of FIG. 1.

"[P]rogram code for encoding each picture of the sequence using the quantization parameter value selected for that picture" is described, e.g., at: pg. 9, lines 16-22; pg. 7, lines 14-15; and pg. 2, lines 10-11. Moreover, the subject matter of this element involves, e.g.: block 228 of FIG. 1.

Independent Claim 14 is directed to "[a] method of performing video rate control on a sequence of pictures to meet network traffic model restrictions" (Claim 14, preamble).

"[P]re-encoding the sequence of pictures for each of a plurality of quantization parameter values" is described, e.g., at: pg. 9, lines 5-11; pg. 7, lines 9-11; and pg. 2, lines 7-8. Moreover, the subject matter of this element involves, e.g.: blocks 214, 216, 218 and 220 of FIG. 1.

"[S]electing for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window" is described, e.g., at: pg. 9, lines 11-16; pg. 7, lines 11-14; and pg. 2, lines 9-10. Moreover, the subject matter of this element involves, e.g.: blocks 222, 224 and 226 of FIG. 1.

"[E]ncoding each picture of the sequence using the quantization parameter value selected for that picture" is described, e.g., at: pg. 9, lines 16-22; pg. 7, lines 14-15; and pg. 2, lines 10-11. Moreover, the subject matter of this element involves, e.g.: block 228 of FIG. 1.

6. Grounds of Rejection to be Reviewed on Appeal

Claims 1 and 3-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,118,817 to Wang et al. (hereinafter "Wang") in view of U.S. Patent No. 5,978,029 to Boice et al. (hereinafter "Boice") in further view of U.S. Patent No. 7,016,337 to Wu et al. (hereinafter "Wu").

The preceding rejection under 35 U.S.C. §103(a) is presented for review in this Appeal with respect to Claims 1, 3-22, as argued with respect to independent Claims 1, 13, and 14.

Regarding the grouping of the claims, Claims 3-12 stand or fall with Claim 1, and Claims 15-22 stand or fall with Claim 14, due to their respective dependencies. Claim 13 stands or falls by itself.

7. Argument

A. Introduction

Video data is generally processed by a video encoder and transferred in the form of bit streams. Variable bit rate ("VBR") video encoders can achieve better quality video compression than constant bit rate ("CBR") video encoders for the same average bit rate as measured over a time interval, such as, for example, over an entire program length. Better quality video compression is achieved with VBR encoding because as the complexity of the video changes

throughout the video sequence, variable bit rate encoded video is created to maintain a constant quality. On the other hand, with CBR encoded video data, the encoded bit rate is kept constant causing the perceived video quality to vary. As a result, the worst case video quality for CBR is generally not as good as the constant quality level for VBR. Since user perception is greatly influenced by the worst case quality, VBR video is generally preferred over CBR video.

Unfortunately, communications networks typically have fixed bandwidth links that are more amenable to CBR video than to VBR video. Consequently, CBR video encoding is typically used to meet the bandwidth requirements of a network traffic model, while VBR video encoding is typically used for applications that do not use fixed bandwidth channels (e.g. DVDs). However, there is a need a for a VBR video scheme which can be used in communication networks, and other situations where a fixed bandwidth is imposed.

Advantageously, the present invention provides "[a]n encoder for encoding a sequence of pictures as a plurality of block transform coefficients to meet network traffic model restrictions" (Claim 1), "[a] computer program product comprising a computer useable medium having computer readable program code embodied thereon for use in a video encoder" (Claim 13), and "[a] method of performing video rate control on a sequence of pictures to meet network traffic model restrictions" (Claim 14) which provide a number of advantages over the prior art and dispense with the problems that plague prior art systems.

In addition, the claims of the pending invention include novel features not shown in the cited references and that have already been pointed out to the Examiner. Thus, it is respectfully asserted that independent Claims 1, 13 and 14 are each patentably distinct and non-obvious over the cited references in their own right. For cxample, the below-identified elements of

independent Claims 1, 13 and 14 are not shown in the cited reference, taken either singly or in any combination. Moreover, these claims are distinct from each other in that they are directed to different implementations and/or include different elements. For example, Claims 1 is directed to an encoder, Claim 13 is directed to a computer program product, and Claim 14 is directed to a method of performing video rate control a sequence of pictures to meet network traffic model restrictions. Moreover, the encoder in Claim 1, the computer program product in Claim 13, and the method in Claim 14, each include different elements from each other and they need to be considered separately. Accordingly, each of independent Claims 1, 13 and 14 represent separate features/implementations of the invention that are separately novel and non-obvious with respect to the prior art and to the other claims. As such, independent Claims 1, 13 and 14 are separately patentable and are each presented for review in this appeal.

B. Whether Claims 1 and 3-22 are Rendered Obvious under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,118,817 to Wang et al. in view of U.S. Patent No. 5,978,029 to Boice et al. in further view of U.S. Patent No. 7,016,337 to Wu et al.

The failure of an asserted combination to teach or suggest each and every feature of a claim remains fatal to an obviousness rejection under 35 U.S.C. § 103. Section 2143.03 of the MPEP requires the "consideration" of every claim feature in an obviousness determination. To render a claim unpatentable, however, the Office must do more than merely "consider" each and every feature for this claim. Instead, the asserted combination of the patents must also teach or suggest *each and every claim feature*. *See In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) (emphasis added) (to establish *prima facie* obviousness of a claimed invention, all the

claim features must be taught or suggested by the prior art). Indeed, as the Board of Patent Appeal and Interferences has recently confirmed, a proper obviousness determination requires that an Examiner make "a searching comparison of the claimed invention - *including all its limitations* - with the teaching of the prior art." *See In re Wada and Murphy*, Appeal 2007-3733, *citing In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis in original). "If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious" (MPEP §2143.03, citing *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)).

The Examiner rejected Claims 1 and 3-22 as being obvious under 35 U.S.C. § 103(a) with respect to U.S. Patent No. 6,118,817 to Wang et al. (hereinafter "Wang") in view of U.S. Patent No. 5,978,029 to Boice et al. (hereinafter "Boice") in further view of U.S. Patent No. 7,016,337 to Wu et al. (hereinafter "Wu"). The Examiner contends that the cited combination discloses all of the elements recited in Claims 1 and 3-22.

Wang relates to an encoder that uses two loops to encode a video signal. A primary open loop rate control attempts to select an quantization parameter by comparing the size of single encoded frame to a target encoded frame size (Wang: col. 4, lines 15-19; col. 9, lines 7-11). If the encoded frame size is greater or less than the target encoded frame, the quantization parameter is adjusted in order to increase or decrease the size of subsequently encoded frames (Wang: col. 4, lines 19-26). However, since the adjustment of the quantization parameter may cause the available bandwidth to be exceeded, a secondary closed loop rate control monitors a cumulative bandwidth balance to ensure that overall available bandwidth is never exceeded (Wang: col. 4, lines 30-32; col. 9, lines 11-28).

Boice relates to an encoding system with two encoders for use in real-time systems (Boice: Title; col. 2, lines 53-56; col. 7, lines 47-48). Boice teaches that a first encoder is employed to analyze a sequence of video frames and derive statistical information regarding the video frames (Boice: col. 2, lines 56-61; col. 8, lines 13-17). The first encoder is coupled to a control processor which processes the statistical information to produce a value for a parameter used to encode the sequence of video frames (Boice: col. 2, lines 61-65; col. 12, lines 31-35). The control processor sends the value associated with an encoding parameter to a second encoder which is also coupled to the processor (Boice: col. 2, lines 65-67; col. 12, lines 31-35). The second encoder then uses the value to encode each frame of the sequence of video frames, thereby producing a bit stream of encoded data (Boice: col. 3, lines 1-4; col. 12, lines 35-38).

Wu relates to a system and method for multiplexing a plurality of channels for transmission over a single medium (Wu: col. 5, lines 11-14). The system includes a plurality of encoders, a statistical multiplexer and a transport medium (Wu: col. 5, lines 63-66). The statistical multiplexer includes a scheduler and a multiplexer which receive streams and combine them into a single stream that matches the bandwidth of the physical transport medium (Wu: col. 6, lines 9-16).

It will be shown herein below that the limitations of Claims 1, 13 and 14 reproduced herein are not shown in the cited combination of Wang, Boice and Wu, and that Claims 1, 13 and 14 should be allowed, including the claims dependent there from as identified in Section 6 herein.

B1. Claims 1 and 3-22

It should be noted that Claims 3-12 directly or indirectly depend from independent Claim 1, and Claims 15-22 directly or indirectly depend from independent Claim 14. Thus, Claims 3-12 include all the elements of Claim 1, and Claims 15-22 include all the elements of Claim 14. No claims are dependent upon independent Claim 13.

Initially, it is respectfully asserted that the rejection of Claims 1, 13 and 14 is improper because the modification of Wang with Boice would change the principle of operation of the invention in Wang. Pursuant to MPEP § 2143.01(VI), "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)". A finding that the principle of operation of a prior art invention has been changed is appropriate when the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate" (see MPEP § 2143.01(VI), quoting *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959)).

Wang discloses an encoding system using a single encoder with two loops to encode a video signal. A primary open loop is used to select a quantization parameter size (Wang: col. 4, lines 15-19; col. 9, lines 7-11), and a secondary closed loop is used to ensure that available bandwidth is never exceeded (Wang: col. 4, lines 30-32; col. 9, lines 11-28). On the other hand, Boice relates to an encoding system that utilizes two encoders to encode video frames in a real-time setting (Boice: Title; col. 2, lines 53-56; col. 7, lines 47-48). A first encoder generates

statistical information about a sequence of video frames to be encoded (Boice: col. 2, lines 56-61; col. 8, lines 13-17). A control processor coupled to the first encoder uses the statistical information to produce a value for a parameter which is used to encode the sequence of frames (Boice: col. 2, lines 61-65; col. 12, lines 31-35), and sends the value to a second encoder which encodes the frames in accordance with the value (Boice: col. 3, lines 1-4; col. 12, lines 35-38).

In the present case, the Examiner contends that the first statistic gathering encoder in Boice discloses "pre-encoding the sequence of pictures for each of a plurality of quantization parameter values". Thus, the Examiner attempts to modify Wang's encoding system with the first encoder of Boice. However, assuming, arguendo, that Examiner's interpretation of Boice is accurate, the modification of Wang with Boice in this manner is improper because it changes the principle of operation of the invention in Wang.

In order to modify the encoding system in Wang with the statistical gathering encoder of Boice, a substantial reconstruction and redesign of Wang's system would be necessary. For instance, an entirely new encoding subsystem would have to be added to the system in Wang which would allow Wang's system to gather statistics about a sequence of frames which is to be encoded. In addition, the control processor in Boice, which analyzes the statistical information generated by the first encoder and uses the statistical information to produce a value for an encoding parameter, would also have to be incorporated into Wang's encoding system. Even further, the basic principle under which Wang operates would have be changed. Rather that utilizing the two-pass encoding scheme described in Wang, the encoding system in Wang would have to be reconfigured or reprogrammed to implement the single pass encoding scheme of Boice. Given all the changes that would be necessary to modify Wang with Boice, the

combination of Wang with Boice results in a change in the principle of operation of the encoder in Wang. Accordingly, the present rejection is believed improper for at least this reason.

However, even if it is somehow determined that combination of Wang and Boice is proper, the rejection of Claims 1, 13 and 14 would still be improper because the cited references fail to teach or suggest *"selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window"* as recited in Claims 1 and 14, and as essentially recited in Claim 13.

In the Examiner's rejection of Claims 1, 13 and 14, Wang is relied on as disclosing the above-identified element. More specifically, the Examiner relies on a single passage in Wang which states:

> In accordance with the present invention, a primary open loop rate control selects an optimized quantization parameter Q by determining a desired size for an individual frame...
> (Wang: col. 4, lines 14-16).

As evidenced by the above passage, Wang does teach that a quantization parameter is selected for encoding a frame. However, neither the cited passage, nor any other passage in Wang, discloses that the selection of the quantization parameter is "responsive to... the neighboring pictures in a predetermined time window" as set forth in the present claims. In fact, the selection of the quantization parameter in Wang does not in any way involve a consideration of the neighboring pictures. Rather, as explained in this reference, the value of the quantization

parameter is selected by comparing the size of a single encoded frame with a target frame size, and subsequently increasing or decreasing the quantization parameter depending upon the result produced by the comparison (i.e., depending upon whether the comparison reveals that the encoded frame size is greater or less than the target frame size) (Wang: col. 4, lines 15-26; col. 9, lines 7-11). Moreover, since Wang does not refer to the neighboring pictures when selecting a quantization parameter, it logically follows that Wang further fails to teach that the selection of the quantization parameters is responsive to the "quantization parameter values' and "bit rate operating points" of the neighboring pictures. Accordingly, for at least these reasons, Wang cannot be interpreted as teaching or suggesting *"selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window"* as recited in Claims 1 and 14, and as essentially recited in Claim 13.

It should be noted that neither of the other cited reference teach or suggest this element either. In general, Boice teaches that the dual encoder system described therein can generate values for parameters, including a quantization parameter, by generating and analyzing statistics about a sequence of frames before they are encoded. However, this reference fails to disclose that quantization parameter values are selected which are responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window. Likewise, Wu fails to disclose the same. It appears that this reference was cited for the limited purpose of disclosing a "predetermined time window". Thus, this reference discloses

little if any anything regarding the selection of quantization parameters. Accordingly, the present rejection is believed improper since all of the cited reference fail to teach or suggest the above-identified element of Claims 1, 13 and 14.

In addition to the above discussion, the present rejection is also believed to be improper because the cited references, whether taken singly or in combination, fail to teach or suggest *"pre-encoding the sequence of pictures for each of a plurality of quantization parameter values"* as recited in Claims 1, 13 and 14.

In rejecting Claims 1, 13 and 14, the Examiner concedes that Wang fails to disclose the above-identified element, but asserts that such is disclosed by Boice. More specifically, the Examiner relies on the following passages in Boice as teaching the above-identified element:

> Subsystem E1 is configured to derive statistics on one or more characteristics of a sequence of frames to be encoded. These characteristics are statistically analyzed by controlling processor 520 to dynamically develop a value for one or more controllable parameters to be used by subsystem E2 in encoding a current frame of the sequence of frames, thereby optimizing picture quality and/or encoding performance.
> (Boice: col. 4, lines 26-35)

> The statistical measures can describe different characteristics of an image frame, for example, busyness of a frame, motion between image frames, scene change or fading, etc. Using the calculated statistics, adaptive encoding of the video sequence is then carried out by controlling one or more encoding parameters of the real-time encoding process. For example, bit allocation, quantization

> parameter(s), encoding mode, etc., can be changed from frame to frame or macroblock to macroblock within a given frame according to derived statistics of a characteristic (e.g., scene content) of the particular frame(s).
> (Boice: col. 7, lines 30-39)

> E1 is programmed to generate the desired statistics, such as interframe/intraframe non-motion, motion, etc. statistics, which are important to the encoding subsystem's (E2) specific bit rate control algorithm. E2 generates encoded frames based on the statistics generated by encoding subsystem E1.
> (Boice: col. 7, lines 50 – col. 8, line 5)

In accordance with the above passages, Boice teaches that a first encoding subsystem (i.e., E1) can be used to generate statistical information (e.g., statistics relating to the "busyness of a frame, motion between image frames, [and] scene change or fading") regarding a sequence of frames. It is further explained that this statistical information can be used by a second encoding subsystem (i.e., E2) to encode a video sequence. However, the cited passages reproduced above, along with the other passages in Boice, fail to explicitly recite that this dual encoder system involves pre-encoding a sequence of pictures, and further that such pre-encoding is done "for each of a plurality of quantization parameter values." Furthermore, any argument that the statistical gathering performed by the first encoding system would suggest pre-encoding a sequence of pictures for each of a plurality of quantization parameter values would constitute an improperly broad interpretation of Boice. When given its broadest interpretation, Boice teaches that statistical information regarding a sequence of pictures can be gathered in order to

alter a parameter (e.g., a quantization parameter) which is used to encode the sequence of pictures. However, even when Boice is given its broadest interpretation, this reference fails to teach or suggest *"pre-encoding the sequence of pictures for each of a plurality of quantization parameter values"* as recited in Claims 1, 13 and 14.

The other cited reference, Wu, fails to cure the deficiencies of Wang and Boice with respect to disclosing the above-identified element. As mentioned briefly above, it appears that Wu was only cited for the limited purpose of disclosing a "predetermined time window". However, regardless of whether Wu actually discloses a "predetermined time window" as the Examiner contends, the rejection of Claims 1, 13 and 14 is improper since Wu, like the other cited references, fails to teach or suggest anything about pre-encoding a sequence of pictures for each of a plurality of quantization parameter values.

Therefore, for at least the reasons set forth above, Claims 1, 13 and 14 are believed to be patentably distinct and non-obvious over the combination of Wang, Boice and Wu.

Moreover, "[i]f an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious" (MPEP §2143.03, citing *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)). All remaining claims depend from either Claim 1 or Claim 14, or a claim which itself is dependent from one of these claims. Accordingly, all remaining claims are patentably distinct over the cited references for at least the reasons set forth above. Thus, reconsideration of this rejection is respectfully requested.

C. Conclusion

At least the above-identified limitations of the pending claims are not disclosed or suggested by the teachings of the cited references. Accordingly, it is respectfully requested that the Board reverse the rejections of Claims 1, and 3-22 under 35 U.S.C. § 103(a).

Please charge the amount of $540.00, covering fee associated with the filing of the Appeal Brief, to **Thomson Licensing Inc., Deposit Account No. 07-0832**. In the event of any non-payment or improper payment of a required fee, the Commissioner is authorized to charge **Deposit Account No. 07-0832** as required to correct the error.

Respectfully submitted,

Dated: January 20, 2010

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8. CLAIMS APPENDIX

1. (Previously Presented) An encoder for encoding a sequence of pictures as a plurality of block transform coefficients to meet network traffic model restrictions, the encoder comprising an iterative loop for selecting one of a plurality of quantization parameter values for each picture, said iterative loop comprising:

pre-encoding means for pre-encoding the sequence of pictures for each of a plurality of quantization parameter values;

selecting means for selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window; and

encoding means for encoding each picture of the sequence using the quantization parameter value selected for that picture.

2. (Canceled)

3. (Previously Presented) An encoder as defined in Claim 1, wherein the quantization parameter value selected for the time window encodes a window's worth of pictures at about a target picture rate.

4. (Previously Presented) An encoder as defined in Claim 1, wherein the quantization parameter value selected for the time window encodes a window's worth of pictures at about a target bitrate.

5. (Previously Presented) An encoder as defined in Claim 1, wherein the quantization parameter values selected for each picture in the video sequence and for the neighboring pictures in the same time window as the given picture are chosen to encode the pictures to be transmitted within a time window of preset duration to be encoded within a target number of bits.

6. (Previously Presented) An encoder as defined in Claim 1, wherein the sequence of video pictures comprises a group of pictures.

7. (Previously Presented) An encoder as defined in Claim 1, wherein the sequence of video pictures comprises pre-stored video content.

8. (Previously Presented) An encoder as defined in Claim 1, wherein a portion of sequence of video pictures to be transmitted within a preset time duration meets a network traffic model restricting the number of bits to be transmitted within the preset time duration.

9. (Previously Presented) An encoder as defined in Claim 1, wherein the selecting means for selecting one of the plurality of quantization parameter values for each picture of the video sequence comprises multi-pass encoding means to optimize the quantization parameter value selected to encode each picture.

10. (Previously Presented) An encoder as defined in Claim 1, wherein the pre-encoding means for pre-encoding the sequence of pictures for each of the plurality of quantization parameter values comprises means for re-using motion vector values.

11. (Previously Presented) An encoder as defined in Claim 1 in combination with a decoder for decoding encoded block transform coefficients that meet network traffic model restrictions to provide reconstructed pixel data, the decoder comprising a variable length decoder for decoding video data corresponding to the time window having a preset duration according to a network traffic model.

12. (Previously Presented) A codec comprising an encoder as defined in Claim 1, and a decoder for decoding encoded block transform coefficients that meet network traffic model restrictions to provide reconstructed pixel data, the decoder comprising a variable length decoder for decoding video data corresponding to a decoder time window having a preset duration according to the network traffic model.

13. (Previously Presented) A computer program product comprising a computer useable medium having computer readable program code embodied thereon for use in a video encoder, the computer program product comprising:

program code for pre-encoding the sequence of pictures for each of a plurality of quantization parameter values;

program code for selecting for each picture of the sequence one of the plurality of

quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in the sliding time window; and

program code for encoding each picture of the sequence using the quantization parameter value selected for that picture.

14. (Previously Presented) A method of performing video rate control on a sequence of pictures to meet network traffic model restrictions, the method comprising:

pre-encoding the sequence of pictures for each of a plurality of quantization parameter values;

selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window; and

encoding each picture of the sequence using the quantization parameter value selected for that picture.

15. (Original) A method as defined in Claim 14 wherein the sequence of pictures comprises a sequence of video frames.

16. (Previously Presented) A method as defined in Claim 14 wherein the quantization parameter value selected for a predetermined time window encodes a window's worth of pictures at about a target bitrate.

17. (Previously Presented) A method as defined in Claim 14 wherein the quantization parameter values selected for each picture in the video sequence and for the neighboring pictures in the same predetermined time window as the given picture are chosen to encode the pictures to be transmitted within a time window of preset duration to be encoded within a target number of bits.

18. (Original) A method as defined in Claim 14 wherein the sequence of video pictures comprises a group of pictures.

19. (Original) A method as defined in Claim 14 wherein the sequence of video pictures comprises pre-stored video content.

20. (Original) A method as defined in Claim 14 wherein a portion of the sequence of video pictures to be transmitted within a preset time duration meets a network traffic model restricting the number of bits to be transmitted within the preset time duration.

21. (Original) A method as defined in Claim 14 wherein selecting one of the plurality of quantization parameter values for each picture of the video sequence comprises using multi-pass encoding techniques to optimize the quantization parameter value selected to encode each picture.

22. (Original) A method as defined in Claim 14 wherein pre-encoding the sequence of pictures for each of the plurality of quantization parameter values comprises re-using motion vector values.

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9. RELATED EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS APPENDIX

None.